

CS 440 – Databases

Homework 5

Due: Fri. March 26, 2021

- P.222, Ex. 5.2.1
- P.256–257, Ex. 6.1.2–6.1.4
- P.267–268, Ex. 6.2.1–6.2.3 parts a–c only.
- P.279, Ex. 6.3.1 a,b, Ex. 6.3.2, a–d
- P.289, Ex. 6.4.6
- P.295, Ex. 6.5.1, 6.5.2

Solutions

5.2.1

- a) $\{(1, 0, 1), (5, 4, 9), (1, 0, 1), (6, 4, 16), (7, 9, 16)\}$
- b) $\{(1, 0), (3, 3), (3, 4), (4, 3), (1, 1), (4, 3)\}$
- c) $\{(0, 1), (0, 1), (2, 3), (2, 4), (3, 4)\}$
- d) $\{(0, 1), (0, 2), (2, 4), (2, 5), (3, 4), (3, 4)\}$
- e) $\{(0, 1), (2, 3), (2, 4), (3, 4)\}$
- f) $\{(0, 1), (2, 4), (2, 5), (3, 4), (0, 2)\}$
- g) $\{(0, 2), (2, 7), (3, 4)\}$
- h) $\{(0, 1.5), (2, 4.5), (3, 4)\}$
- i) $\{0, 2, 3\}$
- j) $\{(2, 4)\}$
- k) $\{(0, 1, \perp), (2, 3, 4), (2, 3, 4), (0, 1, \perp), (2, 4, \perp), (3, 4, \perp)\}$
- l) $\{(2, 3, 4), (2, 3, 4), (\perp, 0, 1), (\perp, 2, 4), (\perp, 2, 5), (\perp, 0, 2)\}$
- m) $\{(0, 1, \perp), (2, 3, 4), (2, 3, 4), (0, 1, \perp), (2, 4, \perp), (3, 4, \perp), (\perp, 0, 1), (\perp, 2, 4), (\perp, 2, 5), (\perp, 0, 2)\}$
- n) $\{(0, 1, 2, 4), (0, 1, 2, 5), (0, 1, 3, 4), (0, 1, 3, 4), (2, 3, \perp, \perp), (0, 1, 2, 4), (0, 1, 2, 5), (0, 1, 3, 4), (0, 1, 3, 4), (2, 4, \perp, \perp), (3, 4, \perp, \perp), (\perp, \perp, 0, 1), (\perp, \perp, 0, 2)\}$

6.1.2

- a) `SELECT address FROM Studio WHERE name='MGM';`
- b) `SELECT birthdate FROM MovieStar WHERE name='Sandra Bullock';`
- c) `SELECT starName FROM StarsIn WHERE movieYear=1980 OR movieTitle LIKE '%Love%';`
- d) `SELECT name FROM MovieExec WHERE netWorth>=10000000;`
- e) `SELECT name FROM MovieStar WHERE gender='M' OR address LIKE '%Malibu%';`

6.1.3

- a) `SELECT model, speed, hd FROM PC WHERE price<1000;`
- b) `SELECT model, speed AS gigahertz, hd AS gigabytes FROM PC WHERE price<1000;`
- c) `SELECT DISTINCT maker FROM Product WHERE type='Printer';`
- d) `SELECT model, ram, screen FROM Laptop WHERE price>1500;`
- e) `SELECT * FROM Printer WHERE color;`
- f) `SELECT model, hd FROM PC WHERE speed=3.2 AND price<2000;`

6.1.4

- a) `SELECT class, country FROM Classes WHERE numGuns>=10;`
- b) `SELECT name AS shipName FROM Ships WHERE launched<1918;`
- c) `SELECT ship, battle FROM Outcomes WHERE result='sunk';`
- d) `SELECT name FROM Ships WHERE name=class;`
- e) `SELECT name FROM Ships WHERE name LIKE 'R%';`
- f) `SELECT name FROM Ships Where name LIKE '% % %';`

6.2.1

- a) `SELECT starName FROM StarsIn WHERE movieTitle='Titanic'`
`INTERSECT`
`SELECT name AS starName FROM MovieStar WHERE gender='M';`
- b) `SELECT starName FROM StarsIn WHERE movieTitle IN`
`(SELECT title FROM Movies WHERE studioName='MGM' AND year=1995);`
- c) `SELECT name FROM MovieExec WHERE cert# IN`
`(SELECT presC# FROM Studio WHERE name='MGM');`

6.2.2

- a) `SELECT maker, speed FROM Product NATURAL JOIN Laptop WHERE hd>=30;`
- b) `SELECT * FROM`
`(SELECT model, price FROM PC) UNION`
`(SELECT model, price FROM Laptop) UNION`
`(SELECT model, price FROM Printer)`
`WHERE model IN (SELECT model FROM Product WHERE maker='B');`
- c) `(SELECT maker FROM Product WHERE type='Laptop')`
`EXCEPT`
`(SELECT maker FROM Product WHERE type='PC');`

6.2.3

- a) `SELECT name FROM Ships NATURAL JOIN Classes WHERE displacement>35000;`
- b) `SELECT name, displacement, numGuns FROM Ships NATURAL JOIN Classes`
`WHERE name IN (SELECT ship AS name FROM Outcomes WHERE battle='Guadalcanal');`
- c) `SELECT name FROM Ships`
`UNION`
`SELECT ship AS name FROM Outcomes;`

6.3.1

- a) `SELECT maker FROM Product NATURAL JOIN PC WHERE speed>=3.0;`
- b) `SELECT model FROM Printer WHERE price=(SELECT MAX(price) FROM Printer);`

6.3.2

- a) `SELECT DISTINCT country FROM Classes WHERE numGuns=(SELECT MAX(numGuns) FROM Classes);`
- b) `SELECT DISTINCT class`
`FROM Ships JOIN Outcomes ON Ships.name=Outcomes.ship`
`WHERE result='sunk';`
- c) `SELECT name`
`FROM Ships NATURAL JOIN Classes`
`WHERE bore=16;`
- d) `SELECT battle`
`FROM Outcomes JOIN Ships ON Ships.name=Outcomes.ship`
`WHERE class='Kongo';`

6.4.6

- a) `SELECT AVG(speed) FROM PC;`
- b) `SELECT AVG(speed) FROM Laptop WHERE price>1000;`
- c) `SELECT AVG(price)
FROM PC
WHERE model IN (SELECT model FROM Product WHERE maker='A');`
- d) `SELECT AVG(price)
FROM (SELECT price, model FROM PC) UNION (SELECT price, model FROM Laptop)
WHERE model in (SELECT model FROM Product WHERE maker='D');`
- e) `SELECT speed, AVG(price)
FROM PC
GROUP BY speed;`
- f) `SELECT maker, AVG(screen)
FROM Product NATURAL JOIN Laptop
GROUP BY maker;`
- g) `SELECT maker
FROM Product NATURAL JOIN PC
GROUP BY maker
HAVING count(model)>=3;`
- h) `SELECT maker, MAX(price)
FROM Product NATURAL JOIN PC
GROUP BY maker;`
- i) `SELECT speed, MAX(price)
FROM PC
WHERE speed>2.0
GROUP BY speed;`
- j) `SELECT maker, AVG(hd)
FROM Product NATURAL JOIN PC
WHERE maker IN (SELECT maker FROM Product WHERE type='printer')
GROUP BY maker;`

6.5.1

- a) `INSERT INTO Product(maker, model, type) VALUES ('C', 1100, 'PC');`
`INSERT INTO PC(model, speed, ram, hd, price) VALUES (1100, 3.2, 1024, 180, 2499);`
- b) `INSERT INTO Product(maker, model, type)
SELECT (maker, model, 'Laptop') FROM Product WHERE type='PC';`
`INSERT INTO Laptop(model, speed, ram, hd, screen, price)
SELECT (model+1100, speed, ram, hd, 17, price+500) FROM PC;`
- c) `DELETE FROM Product WHERE model in (SELECT model FROM PC WHERE hd<100);`
`DELETE FROM PC WHERE hd<100;`
- d) `DELETE FROM Laptop
WHERE model IN (SELECT model FROM Product
WHERE maker NOT IN (SELECT maker FROM Product
WHERE type='Printer'));`
`DELETE FROM Product
WHERE type='Laptop' AND
model IN (SELECT model FROM Product
WHERE maker NOT IN (SELECT maker FROM Product
WHERE type='Printer'));`
- e) `UPDATE Products SET maker='A' WHERE maker='B';`
- f) `UPDATE PC SET ram=2*ram, hd=hd+60;`
- g) `UPDATE Laptop SET screen=screen+1, price=price-100`

```
WHERE model IN (SELECT model FROM Product WHERE maker='B');
```

6.5.2

- a) INSERT INTO Classes(class, type, country, numGuns, bore, displacement)
VALUES ('Nelson', 'bb', 'Great Britain', 9, 16, 34000);
INSERT INTO Ships(name, class, launched) VALUES ('Nelson', 'Nelson', 1927);
INSERT INTO Ships(name, class, launched) VALUES ('Rodney', 'Nelson', 1927);
- b) INSERT INTO Classes(class, type, country, numGuns, bore, displacement)
VALUES ('Vittorio Veneto', 'bb', 'Italy', 9, 15, 41000);
INSERT INTO Ships(name, class, launched)
VALUES ('Vittorio Veneto', 'Vittorio Veneto', 1940);
INSERT INTO Ships(name, class, launched)
VALUES ('Italia', 'Vittorio Veneto', 1940);
INSERT INTO Ships(name, class, launched)
VALUES ('Roma', 'Vittorio Veneto', 1942);
- c) DELETE FROM Ships WHERE name IN (SELECT ship FROM Outcomes WHERE result='sunk');
- d) UPDATE Classes SET bore=bore*2.5, displacement=displacement/1.1;
- e) DELETE FROM Classes WHERE (SELECT COUNT(name) FROM Ships WHERE Ships.class=Classes.class)<3;